GRADE 12 ESSENTIAL MATHEMATICS
UNIT B – VEHICLE FINANCE
WORKBOOK

Name:_____
Date: _____

MrF

This workbook is compiled by a Manitoba teacher and comprises:

Selected questions from Manitoba Provincial Exams as cited here:

"Manitoba Education and Advanced Learning School Programs Division Winnipeg, Manitoba, Canada"

Selected Questions from the Manitoba Distance Learning Website (merlin.mb.ca)

Supporting Materiel (tables, etc.) are at the end of this workbook.

Note on Taxes. Taxes are a rather fluid government policy. The rate of the tax(es) and how they are applied changes every few years or with each elected government. See tax table for vehicles at the end of this workbook

Tax Application. In these extracts of questions that I have extracted we will simply assume that PST and GST are **applied on all** goods and services unless otherwise indicated.

Rate of Retail Tax(es). For the purposes of this workbook (extracts of proper Manitoba Exams) the **PST** has been calculated as **8% GST is 5%** throughout, unless otherwise indicated. Be aware they fluctuate every decade by a percentage point or two.

Mb Prov Exam Jan 2016
** PST is 8% in this year**

1. State 2 advantages and 2 disadvantages of buying a used car rather than buying a similar new car.

ADVANTAGES	DISADVANTAGES
1:	1:
2:	2:

2. Mark wants to buy a new truck worth $25,500. The dealership offers him a trade-in value of $3,500 for his used car. Calculate the purchase price of the new truck after taxes. (GST:5%; PST:8%)

3. State 1 way to decrease the total amount paid to finance the car you have decided to buy.

4. Nancy is purchasing a new vehicle for $26,500 after taxes at 4.5% for 5 years. [Use the loan tables at the end of this workbook, or if you have access to a bank website or a loan App on your phone try that as a comparison or check].

   A) Calculate Nancy's monthly payment.

   B) At another financial institution Nancy is offered a loan with a monthly payment of $400 for 7 years. Justify [explain] which option Nancy should choose.

5. On average, the fuel economy of Jasmine's vehicle is 8.5 L/100 km. In the past month, Jasmine has travelled a total of 2800 km.

   A) Calculate the total litres of gas Jasmine's vehicle used for the month based on the average fuel economy.

   B) State the total cost of fuel used if it costs $1.23 per litre.

6. Choose the *one* letter that best completes the statement below.

When insuring a vehicle in Manitoba, the factor that does **not** affect your premium is:

    a) your driving record   b) your gender

    c) the type of vehicle   d) the use of vehicle

7. Bryan's 20-year-old vehicle has broken down. He therefore pushes it into a repair shop in Manitoba. His car needs to have the radiator ($500) and timing belt ($450) replaced. The labour cost is $120 per hour and it takes 4 hours to repair his vehicle. Calculate how much it costs to have his vehicle repaired after taxes.

Mb Prov Exam JUN 2016

10. Omar buys a new car with a base price of $21 800 and purchases the following options:
    Navigation system: $1000
    Sound system: $800

Calculate the cost, after taxes, of purchasing the new vehicle if he receives $3000 for his trade-in.

11. State 1 disadvantage of buying a used vehicle.

12. Michel is purchasing a new vehicle. The price of the vehicle is $30,000 and it will depreciate 20% in the first year.

Calculate the value of the vehicle after the first year.

13. Manhatten is considering leasing a vehicle for her courier company. State 2 reasons why she **should not** lease a vehicle.

14. The fuel economy of Gina's vehicle is 7 L/100 km. She is planning to drive her vehicle from Winnipeg to Toronto, a distance of 2230 kilometres.

   A) Determine the total amount of fuel in litres required for the trip.

   B) Determine the cost of the trip if the fuel price is $1.30/L.

15. Alicia is purchasing a new vehicle for $24 000, after taxes. She is financing the vehicle for 4% over 5 years.

   A) Calculate Alicia's monthly vehicle payment [use the loan table at end of this work book; check it with a bank website or an loan app on your phone]

   B) Calculate the total amount of interest she will pay over the 5 years to finance her car.

16. Julie is moving from rural Manitoba to Winnipeg for her job. Her insurance broker told her that it will now be more expensive to insure her car.

A) State why Julie's premiums will increase.

B) Julie retires from her job and wants to continue driving her car. State what she can do to decrease her premiums.

Mb Prov Exam JAN 2017
PST = 8%
17. State 2 costs of operating a vehicle, other than car payments and car insurance.

18. Izzy wants to buy a new car with a base price of $22,500 before taxes. She wants the following options worth $2,450 before taxes: leather seats, sunroof, and chrome wheels. (PST = 8%)
    A) State the sticker price of the car.
    B) Izzy has a car to trade-in worth $12 250. Calculate the total cost of the car after taxes.

20. Barry wants to lease a new car valued at $23,275 before taxes. The payment for the car is $340 per month plus taxes for a 4-year lease with a down payment of $2,000.

A) Calculate the total cost for leasing this car.
B) State the residual value of the car before taxes using a 40% residual rate.

21. Emily brought her vehicle into a service centre in Manitoba for a tune-up. The tune-up included the following items: (PST = 8%)

Item	Details	Cost
Replace windshield wipers	2 wipers	$12 per wiper
Oil change	4 L oil	$3 per litre
	1 filter	$22 per filter
Labour	2.5 hours	$110 per hour

Calculate the total cost of the tune-up after taxes.

22. Zoë's vehicle uses 7.6 L of fuel for every 100 km driven. The cost of fuel is $1.05/litre, including taxes.

Calculate the cost of fuel for Zoë to drive her vehicle 2,000 km.

Choose the one letter that best completes the sentence below.

23. When purchasing car insurance, third party liability is the
   a) amount you pay every year for insurance
   b) amount you pay for extra coverage against damage to another person or their property
   c) one-time lump sum payment you pay to the insurance company when you first buy the car
   d) amount of the insurance claim you must pay when you are at fault for causing an accident

24. A new (or new to you) car is worth $29,000

   A) it depreciates 30% in the first year. State the depreciation amount after the first year **and the value of the car after the first year**.

   B) The same car depreciates 20% in the second year. State the amount the car depreciated in the second year *and its value at the end of the second year*.

Mb Prov Exam JUN 2017

25. A car has a value of $23,000. It depreciates at a rate of 20% per year. Calculate the value of the car at the end of 2 years.

26. Saar wants to buy a new car for $23,500 after taxes. He gets a 4-year loan at an annual interest rate of 6.75%.

   A) Calculate the amount of interest paid for the first month.
   [Hint: I = Prt]

   B) Saar's monthly car payment is $560.01. Calculate the amount of interest paid over the life of the loan.

27. Jersey wants to buy a used car from her friend, Jack. The price of the car is $7,000. She needs to fix a few things on the car.

Repairs	Total Cost
New Tires	$500
Engine Tune-Up	$110

The ''book value' of the car is $5,000. She needs to get a lien search worth $18 and a $40 safety inspection before taxes.

   *Lien searches and Safety inspections in Manitoba are **not charged** PST; GST applies however*

Calculate the total taxes she will pay for this car.

28. A retired couple drives 500 km each month to go to the dog park, the grocery store, and the mall.
State the type of car insurance policy their agent would recommend.

29. Mabon was told by a dealership that his new car would use 5.5 L of fuel for every 100 km driven. In reality, the car is using 8 L of fuel for every 100 km he drives.

Calculate how much more fuel is used than expected if he drives 1,500 km.

30. Choose the letter that best completes the statement below. Your car insurance premium is not affected by:

    A) moving to the city from the country
    B) changing the amount of deductible
    C) being in a demerit position on the Driver Safety Rating scale (DSR)
    D) changing the type of insurance

32. Jonas is purchasing a car. The following table shows the various details of his purchase.

Value of Car	$23 000	Number of Payments	48
Tax	$2990	Amount Borrowed	$22 990
Down Payment	$3000	Cost of Financing	$1840

    A) Calculate the total cost of the car after taxes and financing.

    B) Jonas paid a total of $24,830 in monthly car payments.
    State the amount he paid each month.

33. Wilma needs to get one of her car's headlights replaced. The headlight will cost $200. It will take 1.5 hours of labour to replace the headlight at a rate of $90 an hour.

Calculate the total cost, after taxes, of replacing the headlight.

Mb Prov Exam JAN 2018
PST 8 %

34. Shania wants to know how much tax she will pay on a new vehicle if she buys a $17,000 vehicle and trades in her current vehicle valued at $4,000.
Calculate the **amount of tax** she will pay for this new vehicle.

35. Describe 2 advantages of leasing a car rather than financing the purchase of a similar new car.

36. Jean is financing the purchase of a new vehicle. She has saved money for the down payment.
The table below shows the details of the purchase.

Price of new vehicle	$26 000
Trade-in value of current vehicle	$2000
Tax	$3120
Down payment	$3000
Monthly payment	$544.39
Term	48 months

A) Calculate the total amount borrowed.

B) Calculate the total monthly payments paid over the term of the loan

C) Calculate the finance charge (interest).

40. Hugo is going to lease a car. He will pay $384.20 per month, after taxes, for 36 months. He will make a down payment of $1,500.

Calculate the total cost paid by Hugo at the end of the 36-month lease.

41. Describe 2 factors, other than the make, model, and year of the vehicle, that can affect the cost of your car insurance.

42. José and Shurjeel went on a road trip and recorded the following information:

	Distance Driven	Amount of Gas Used	Cost
Monday	1200 km	45 L	$49.50
Tuesday	800 km	38 L	$19.00
Wednesday	1400 km	47 L	$34.00
Total	3400 km	130 L	$102.50

A) Calculate the fuel economy for the trip in L/100 km.

B) Calculate the cost of gas per litre for the trip.

43. Alise is taking her car in for servicing. She needs the oil changed and an air filter replaced. The cost of labour is $95 per hour. The following table shows the details of the servicing.

Parts	Cost of Parts	Labour Hours Required
Oil and filters	$50	0.5

Calculate the total cost Alise will pay with taxes included.

Mb Prov Exam JUN 2018

44. Melanie purchased a van for $8,000, after taxes. She made a down payment of $1,500 and is financing the remaining balance.

A) Calculate the total amount Melanie will finance.

B) The bank offers Melanie an annual interest rate of 7% over 5 years to finance the van. Calculate the amount of interest Melanie will pay on her first month's payment. [Loan tables at the end of this workbook; check with a bank website or App on your phone if you want]

C) State one way Melanie could reduce the monthly payment for her van.

45. Maya is purchasing a used car from a dealership for $3,500, before taxes. The trade-in value of her old vehicle is $500.

Calculate the total amount Maya will pay for the car, after taxes.

46. Henry is a long-distance delivery driver in Manitoba who needs a new vehicle. He often drives on gravel roads that damage his car.

Explain one reason why Henry should purchase a new vehicle instead of leasing one.

47. The distance from The Pas to Calgary is 1,174 km. Lloyd's scooter has a fuel economy of 1.9 L/100 km. Calculate the amount of fuel used if Lloyd drives his scooter from The Pas to Calgary.

48. Shawna is at an insurance agency to renew her car insurance policy. Describe two changes she could make to lower the total cost of her insurance.

49. Serge needs to pay for the following repairs on his vehicle:

Item	Cost of Parts	Labour Time Required
Muffler	$207	0.5 hour
Transmission	$600	2.5 hours

A) Calculate the total labour cost, before taxes, if the service center charges a rate of $110/hour.

B) Calculate the total amount Serge will pay to the service centre, after taxes.

DISTANCE LEARNING QUESTIONS

Selected questions from the Mb Distance Learning Website lessons:
bblearn.merlin.mb.ca

LESSON 1 - BUYING A VEHICLE

1- 1. Petra wants to buy a used Ford Mustang for $21,000 plus PST and GST. She has $3,000 for a down payment and must take out a loan to pay the balance. The bank charges 5% interest per month and the loan must be repaid in 3 years.
  a) What is the principal amount of the loan?
  b) What is the monthly payment?
  c) How much interest does Petra pay over the loan?

1-2. The total cost of purchasing a new vehicle is $31,743.00 plus PST and GST. Terri is buying the vehicle with a $3,500.00 down payment and a loan to cover the balance. The interest rate on the loan is 5.8% compounded monthly, and Terri agrees to repay the loan in four years (48 monthly payments).

  a) Determine the amount of the loan.
  b) What is the amount of each monthly payment?
  c) What is the total cost of buying the vehicle?
  d) How much interest did Terri pay for the vehicle?
  e) How much would she have saved if she had shopped around and found a bank that would give her a three-year loan at 5.4% compounded monthly? How much would her monthly payments have increased?

Lesson 2 LEASING A VEHICLE

2-1. An extended cab truck leases for $359 per month plus taxes for a lease term of 36 months. A down payment of $4000 is required. Calculate the total amount paid on the lease.

2-2. The extended cab truck in question above has a sale price of $38,000. The residual value is 70% of the sale price plus taxes.
    a) Calculate the residual value.
    b) Calculate the total cost if the truck is purchased outright at the end of the lease.

2 - 3. Ali is planning to lease a two-door sedan that sells for $18,900 plus taxes. The monthly lease payment is $227 plus taxes for a term of 48 months. A down payment of $2000 is required. At the end of the lease Ali plans to finance the residual value at 5% for 3 years. The residual value is 55% of the purchase price of the sedan plus taxes.
    a) Calculate the total cost of the 48 month lease.
    b) Calculate the total cost to finance the residual value of the sedan.
    c) Calculate the total amount Ali will have spent on the sedan including the lease costs, the financing costs and the down payment.

LESSON 3 VEHICLE MAINTENANCE AND INSURANCE

1. The odometer of a mid-size car reads 34 719 at the beginning of a trip and 34 853 at the end of the trip. The car consumes 12.4L of gasoline during the trip.

    a. Determine the fuel economy of the sedan.
    b. If the cost of gasoline is $1.099 per litre, find the cost of driving 100 km.

2. The fuel economy of a two-door convertible is 8.5L/100 km.
    a. How many litres of gasoline are required to drive 20 000 km?
    b. If the cost of gasoline averages $1.159 per litre, find the cost of driving the convertible 20 000km.

3. Find the total cost of servicing a vehicle that requires two headlights at $38.50 each, an exhaust pipe at $165 and a muffler and tail pipe at $105.50. The time required to service the vehicle is 1 hour 45 minutes and the rate the service station charges for labour is $78 per hour.

LESSON 4 BUY COMPARED TO LEASE

1. Reece is planning to either buy or lease a new vehicle. She has $4,000 available for a down payment and she is interested in an SUV that has a purchase price of $34,499.00 plus PST and GST. Whether she buys or leases she wants to own the vehicle at the end of 5 years. If she buys the SUV she can obtain a loan to finance the purchase at 4.5% for 5 years. If she leases, her monthly leasing payment will be $403.00 (including taxes) for 36 months and she will finance the residual amount at 5% for 2 years. The residual value of the SUV is $20,999.00 plus taxes.

    a. What is the total cost of buying the vehicle?
    b. What is the total cost of leasing the vehicle?

2. David, wants to buy a new pickup truck priced at $43 995.00 plus PST and GST. His current truck has a trade-in value of $7500.00.

    a. What is the total cost of the truck if David has $5000.00 for a down payment, and takes out a four year loan at 5.6% for the balance?

    b. What is the value of each monthly payment?

    c. David also considers leasing the truck (still priced at $43 995.00) for four years. He is able to use the old truck valued at $7500.00 plus $5000.00 as the down payment. The monthly lease payment is $471.35 (taxes are included) the residual value is set at $17 139.00 (taxes are included). What is the total cost of the lease?

    d. At the end of the four-year lease, David may decide to buy the truck for the residual value. He would take out a two-year loan at 5.6% to pay for the truck. What is the total cost of the truck after the loan for the residual value is paid off?

    e. Which is more economical - buying the truck or leasing the truck and then buying it later? What reasons might David lease rather than buy the truck?

APPENDIX 1 TO
UNIT B – VEHICLE FINANCE
SUPPORT MATERIEL

Monthly Vehicle Loan Payments per Thousand Borrowed							
Interest Rate	Years to Repay Loan						
	1	2	3	4	5	6	7
4.00%	$85.15	$43.42	$29.52	$22.58	$18.42	$15.65	$13.67
4.25%	$85.26	$43.54	$29.64	$22.69	$18.53	$15.76	$13.78
4.50%	$85.38	$43.65	$29.75	$22.80	$18.64	$15.87	$13.90
4.75%	$85.49	$43.76	$29.86	$22.92	$18.76	$15.99	$14.02
5.00%	$85.61	$43.87	$29.97	$23.03	$18.87	$16.10	$14.13
5.25%	$85.72	$43.98	$30.08	$23.14	$18.99	$16.22	$14.25
5.50%	$85.84	$44.10	$30.20	$23.26	$19.10	$16.34	$14.37
5.75%	$85.95	$44.21	$30.31	$23.37	$19.22	$16.46	$14.49
6.00%	$86.07	$44.32	$30.42	$23.49	$19.33	$16.57	$14.61
6.50%	$86.30	$44.55	$30.65	$23.71	$19.57	$16.81	$14.85
7.00%	$86.53	$44.77	$30.88	$23.95	$19.80	$17.05	$15.09
7.50%	$86.76	$45.00	$31.11	$24.18	$20.04	$17.29	$15.34
8.00%	$86.99	$45.23	$31.34	$24.41	$20.28	$17.53	$15.59
10.00%	$87.92	$46.14	$32.27	$25.36	$21.25	$18.53	$16.60
15.00%	$90.26	$48.49	$34.67	$27.83	$23.79	$21.15	$19.30
20.00%	$92.63	$50.90	$37.16	$30.43	$26.49	$23.95	$22.21
25.00%	$95.04	$53.37	$39.76	$33.16	$29.35	$26.94	$25.31

For other values not in this loan table you can:

a. use a bank website or app on your phone (if allowed)
b. do a linear interpolation between two values (eg: 6.25% for 5 years would be half way between 6% and 6.5%; so would be $19.45
c. Notice an app or bank website will give a more accurate result within a dollar.

SELECTED FORMULAE FOR VEHICLE FINANCE
(that should be on your Study Notes ['Cheat Sheet'])

Simple Interest: $I = Prt$

Gross Debt Service Ratio:

$$GDSR = \frac{\left(\begin{array}{c} Monthly \\ Mortgage \\ Payment \end{array}\right) + \left(\begin{array}{c} Monthly \\ Property \\ Taxes \end{array}\right) + \left(\begin{array}{c} Monthly \\ Heating \\ Costs \end{array}\right)}{Gross\ Monthly\ Income} * 100\%$$

$$TDSR = \frac{Monthly\ Housing\ Costs + All\ other\ monthly\ debts}{Gross\ Monthly\ Income} \times 100\%$$

Exponential Depreciation:
Depreciated Value = Current Value – Depreciation Amount
Depreciation Amount = Current Value * (1 – Rate of depreciation)
Depreciation Value = (Value Retained)^{years}

Fuel Economy (FE); expressed as Litres / 100 km

$$FE = \frac{Litres\ of\ Fuel\ Used}{Distance\ Driven\ in\ Km} * 100$$

TAXES FOR THESE QUESTIONS PRESENTLY ARE 5% GST and 8 % PST unless the table below applies:
Be aware the PST bounces between 6% to 8 % every decade

	Taxes on Vehicle Purchases	
	PST	**GST**
Buying New	PST	GST
Buying Used from a Dealership	PST	GST
Buying Used (Private Sale)	PST calculated on greater of book value or purchase price	No GST
Safety	No PST	GST
Materials and Labour	PST	GST
Lien Search	No PST	No GST

APPENDIX 2
UNIT B – VEHICLE FINANCE
ANSWERS

This appendix is simply the answers, not the full step by step solution. If the full step by step solution is necessary consult the Archived Provincial Exams Website. [https://www.edu.gov.mb.ca/k12/assess/archives/#es]	
Jan 2016	
1. Advantage – cheaper to buy – cheaper to insure – less taxes (if private) – less depreciation loss	Disadvantage – more potential problems – could be no warranty – fewer safety features – fewer technological features (e.g., built-in DVD) – you don't know how it was driven
2. $24 860 (PST 8%)	
3. – increase down payment – decrease amortization period – lower interest rate – buy it outright	
4. A) $493.96 B)Multiple possible answers; your preference. But ensure you explain your preference. – The first option because the total paid is less. – The second option because the monthly payment is less.	
5. A) Fuel used in litres 238 L B) $292.74	
6. b) your gender	But be careful, in some other provinces boys under 25 pay a lot more since they are more reckless.
7. Total with taxes: $1430 1.13= $1615.90	
Jun 2016	
10. Total Cost: $23,278	
11. – no warranty – you do not know how the car was taken care of before you purchased it – hidden damage – can't build a used car to order – may	

not have all the newest safety features or technologies – higher interest rate for financing	
12. $24 000	
13. – excess kilometres will cost more – excess damage to the leased vehicle will result in more charges at the end of the lease (Damages may not need to be repaired on an owned vehicle if they are cosmetic in nature.) – always have a monthly payment – by leasing, the vehicle cannot be used as an asset to secure additional funds (borrowing from a bank) – leasing is more expensive than buying in the long run	
14. A) 156.1 L B) $202.93	
15. A) $442.08 B) $2,524.80	
16. A) – Higher traffic volume in Winnipeg. This means there is a higher risk of making a claim. – She increased her third-party liability. – Winnipeg is in Territory 1, and MPI charges more to insure the vehicle in this area. B) – Julie should change her insurance from all-purpose to pleasure. – Julie could increase her deductible. – Julie could decrease her third party liability	
JAN 2017 (PST = 8%)	
17. Sample answers: – fuel – oil changes – tune-up – replacing tires – driver's license – paying for repairs due to accidents – paying for parking or traffic tickets	
18. A) $24 950	B) $14 351 after tax
20.A) $20 441.60 LEASE	B) $9310 residual value
21. $376.29 (PST is 8%)	
22. $159.60	
23.b) amount you pay for extra coverage against damage to another person or their property	
24. A) $8700 amount of depreciation	B) $4060 depreciation amount in second year.

JUN 2017 (PST 8%)	
25. $14 720	
26. A) $132.19 first month interest	B) $3380.48 total
27. *[awkward question, some taxes are not applied on some items]*	
28. 37.5 L	
29 C) being in a demerit position on the Driver Safety Rating scale (DSR). [But your license will certainly cost more! It isn't your car that drives crazy!]	
30. A) $27,830	B) $517.29
32. $378.55 (PST = 8%)	
JAN 2018	
34. $1,690 (PST 8%)	
35. − lower monthly payment − rarely have to pay for the long-term maintenance costs on car (brakes, timing belt, suspension) − leasing allows for a more convenient car replacement − pay tax on monthly payments not on the full price of the vehicle	
36. A) $24,120 B) $26,130.72 C) $2,010.72	
40. $15,331.20	
41. Sample answers: − driving record (merit position on MPI's Driver Safety Rating system) − where you drive the vehicle − type of insurance (pleasure, all purpose, etc.) − amount of deductible − amount of 3rd party liability insurance − where you live − number of at-fault accidents − excess value coverage on vehicles over $50 000	
42. A) 3.82 L/100 km	B) $0.79/L
43. $110.18 (PST = 8%)	
JUN 2018	
44. B) GST [No GST applies to Used cars, but PST does under 2018 tax policy]	
45.A) $6500 to finance	B) $37.92 The first month of interest
C) − negotiate a lower interest rate − get a longer amortization period − make a larger down payment	

46. $3,390 total she pays for car	
47. Sample Answers: − A new vehicle has unlimited mileage so Henry doesn't have to pay for excess kilometers driven. − All damage on a lease vehicle must be repaired. − Henry can make modifications to the vehicle. − Henry can sell the vehicle.	
48. − decrease 3rd party liability amount − remove loss of use coverage − increase her deductible − change all purpose to pleasure − pay upfront rather than multiple payments	
49. A) $330 Labour before taxes	B) total after taxes: $1284.81
And lots more, just ask!	